

TEAC®

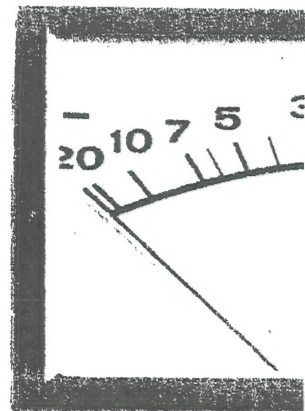
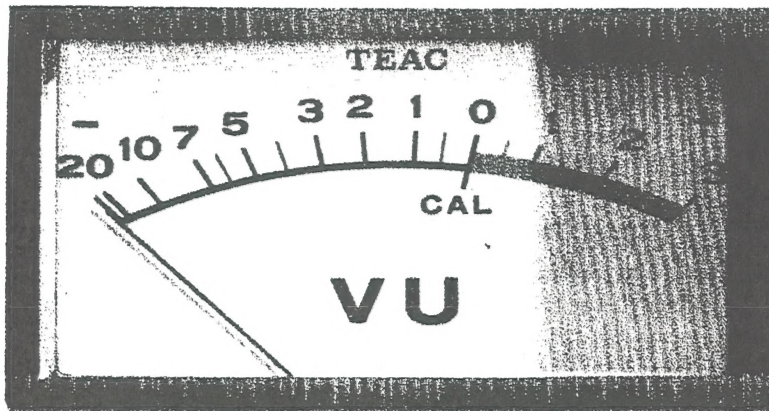
CHECK OUT

INSTRUCTION MANUAL

AN-180
Noise Reduction Unit

LEFT

DOLBY



FILTER DOLBY
IN



PLAY CAL
LEFT



TEAC

AN-180

NOISE REDUCTION UNIT

 DOLBY SYSTEM

Your new **TEAC** Noise Reduction Unit has been manufactured under the strictest quality control procedures. Each unit has been thoroughly tested at the factory. Should any damage have occurred during transit, or should you have any doubts about its performance, contact your dealer as soon as possible.

IT IS VERY IMPORTANT THAT YOU READ AND UNDERSTAND THIS MANUAL BEFORE PLACING THE AN-180 IN OPERATION

LIMITATION:

The **TEAC** model AN-180 makes available the many benefits of the Dolby Noise Reduction System to the owner of any good tape recorder. However, because of the design principle, the Dolby Noise Reduction System will not perform properly with a few types of tape recorders. These include:

1. Tape recorders having an AGC type automatic volume level control on either recording or playback.
2. Tape recorders with a built-in amplifier and speakers when not used with a separate amplifier speaker system.
3. Tape recorders which have incompatible Record and Equalization levels.

Other recording systems should be very satisfactory. However, if the recorder uses the "limiter" recording system, the limiter must be turned off. On all decks with Tone controls, set the tone control to the center, or "flat" position.


SERVICE

Should the equipment need repair, contact the dealer where it was purchased, or the Authorized **TEAC** Service Center nearest you.

- 1) The Warranty period is described on the enclosed warranty card. Read the card for complete details.
- 2) For repairs after expiration of the warranty period a service charge will be made in addition to the price of repair parts.
- 3) If only repair parts are required, place your order with your dealer or the nearest Authorized Service Center. Complete, up-to-date listing of Service Centers is available by writing to the nearest address printed on the back of this manual.

NOTE:

Although the AN-180 may still be under the warranty period, you may be charged for repairs made necessary by abuse, damage, or improper operation.

"Dolby" "Dolbyized", and the Double D  symbol are trademarks of Dolby Laboratories, Inc.

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Read the manual completely before performing any of the steps. Then return to the "Basic operation suggestions" and proceed from there step by step as you make your initial installation. It is recommended that you become thoroughly familiar with this unit before you apply power to it.

The Dolby Noise Reduction System

The Dolby Noise Reduction System is not a totally new development in electronics for it has been used in principle by the major recording studios for many years. It is new, however, to the field of home entertainment, so there are probably many who will ask you, "Why Dolby?" To assist you, and introduce your new AN-180 to you, we would like to discuss the Dolby principle.

A major problem in home tape recording has been the noise and hiss inherent in the tape and added during the recording process. Many kinds of noise exist to plague the serious music lover but the most apparent and persistent type has been the tape hiss formerly considered an inevitable factor in magnetic recording. Hiss was particularly heard during pianissimo or low level passages where it can cover or even distort the delicate passages. It was always present even on recordings made with the best available tape on the most sophisticated equipment without Dolby. Now the Dolby Noise Reduction System totally eliminates tape noise and hiss as a limiting factor in the production of quality recordings. With the **TEAC** AN-180 added to your present system, your recordings will have a wider dynamic range, and a new clarity and brilliance, without any audio loss through filtering. Low level passages are reproduced in all their original beauty, and tonal nuances formerly covered by the noise mask will be heard for the first time.

The Dolby System is not a high-cut filter. Other so-called noise reduction systems operate by filtering out a portion of the high frequency spectrum during playback, thus some loss of the audio spectrum is inevitable. The Dolby principle is to reduce the noise amplitude in relation to the desired signal strength, thus there is no filtering action in the circuit used for the recording/playback process. The original program material is unchanged; only the noise and hiss are affected. However, the Dolby system will not eliminate noise present in the original program source.

Another advantage you will have with your AN-180 will be increased tape economy. The primary reason for using higher recording speeds in the past was to reduce tape noise and hiss, as well as to provide increased frequency response. With the Dolby System, tape hiss is electronically reduced in amplitude so that it no longer limits tape quality. You will discover that the recordings made at slow tape speeds with the AN-180 will equal or surpass those made in the past at higher speeds without it. By recording at lower speeds, your tape costs are at least halved.

The low tape speed advantage is most apparent with cassettes. Not only do cassettes have the slower speed of 1-7/8 ips, but the tape oxide coating is thinner which increases the problem of hiss. Now, with Dolby, true open reel quality can be obtained with a cassette recorder for the first time. Also, many pre-recorded cassettes are now being Dolby encoded, such as from **LONDON RECORDS** and **CBS**.

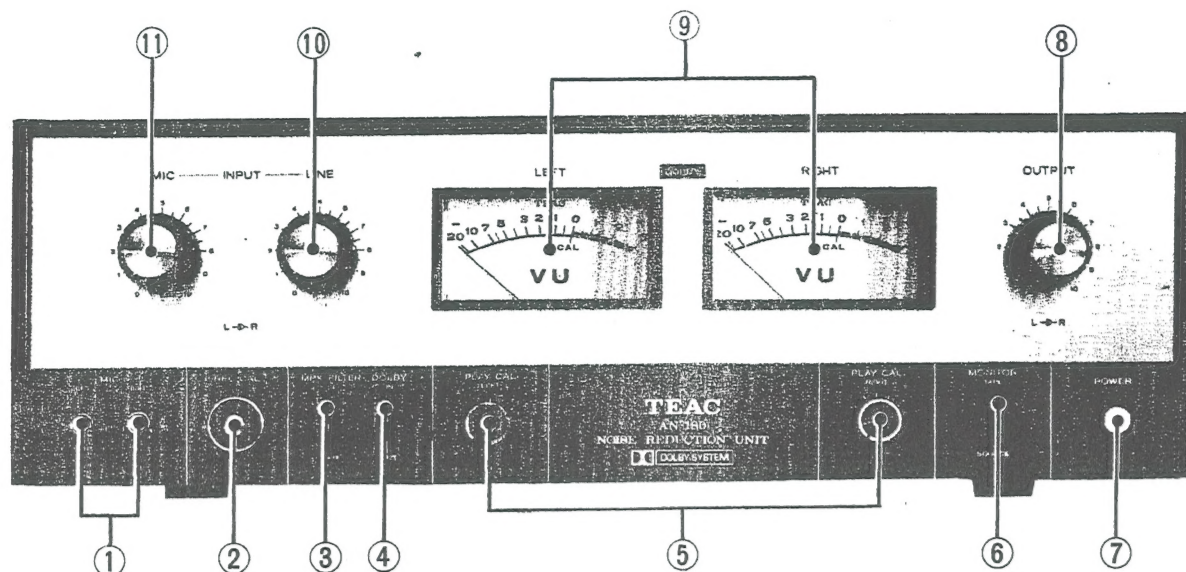
Some FM broadcasting companies will be transmitting Dolby encoded FM broadcasts. This type of broadcasting will become increasingly popular in the immediate future. The **TEAC** AN-180 will provide reception of Dolby encoded FM broadcasts, completely free of matrix or multiplex carrier noise, when connected between your tuner and amplifier.

The **TEAC** AN-180 is designed for versatility and broad applicability. It may be used with virtually any tape recorder provided there is a separate amplifier employed. It can be easily connected to your existing audio center.

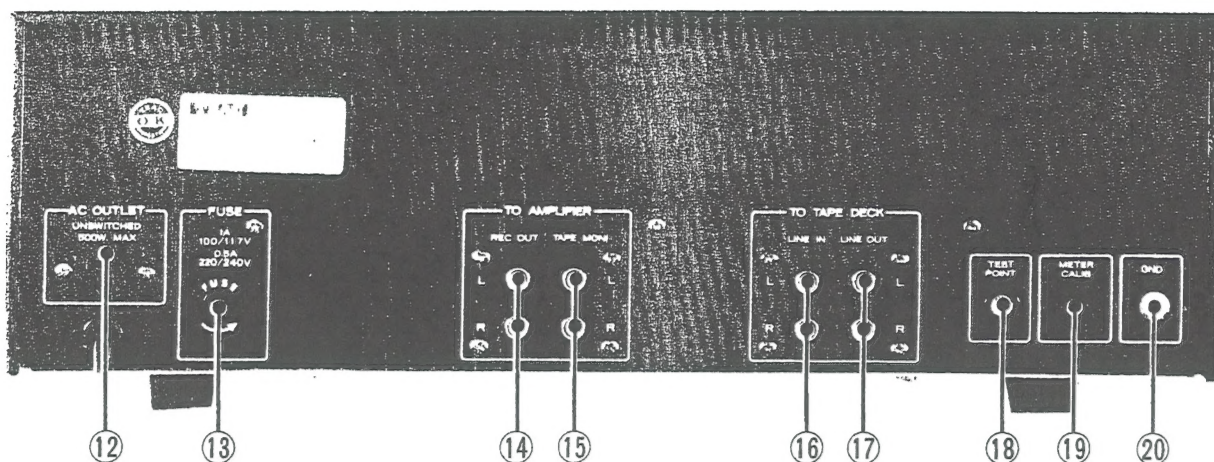
There are no restrictions on the type of tape that may be used providing your tape deck is capable. The Dolby circuit works equally well with recorders using conventional, chromium dioxide, low noise/high output, or high energy tape.

Controls and Connections

NOTE: These pages describe the controls for identification and familiarization purposes only. Before operating them with power applied, read the entire manual and follow the appropriate steps in the specific sections.



- ① **MIC jacks, LEFT and RIGHT:**
Always use these jacks when recording with microphones (600 to 10,000 ohms).
- ② **REC CAL button:**
Used during recording calibration to send a tone (Dolby Level) to your recorder.
- ③ **MPX FILTER switch:**
The MPX FILTER must be used when recording from FM-stereo broadcasts to avoid upsetting the Dolby circuits. Normal position is "OUT". Less than 0.2dB response reduction imposed below 15 KHz.
- ④ **DOLBY switch:**
When placed "IN" keeps the Dolby circuits ready for record and playback. Select "OUT" for playing non-Dolby-encoded tapes. The "DOLBY" name will illuminate above the VU meters only when the DOLBY switch is IN.
- ⑤ **PLAY CAL, LEFT and RIGHT:**
Do not move these controls except during Playback Calibration.
- ⑥ **MONITOR switch:**
Selects "TAPE" or "SOURCE" signal monitoring when using a 3-head tape deck.
- ⑦ **POWER switch:**
Must be "IN" whether Dolby or non-Dolby-encoded tapes are used.
- ⑧ **OUTPUT:**
Controls the monitor and playback levels to the amplifier.
- ⑨ **VU meters:**
Used for Dolby calibration level setting. Use the tape deck's meters during recording.
- ⑩ **LINE-INPUT control:**
Used during recording for adjusting the line input to the tape deck.
- ⑪ **MIC-INPUT control:**
Sets the level for microphone recording.
- ⑫ **AC OUTLET:**
Unswitched and unfused. 500 watts maximum.



⑬ FUSE:

Must match your particular voltage. A spare fuse is provided. If the original fuse blows, replace it. If the spare fuse also blows, take the unit to an authorized **TEAC** Service Center.

⑭ TO AMPLIFIER—REC OUT

tells where to connect these terminals (Note 1). They receive the (normally) non-Dolby-encoded signal (Note 2).

⑮ TO AMPLIFIER—TAPE MONITOR

tells where to connect these terminals (Note 1). They return the (normally) Dolby-decoded signal to the amplifier (Note 2).

⑯ TO TAPE DECK—LINE IN

tells where to connect these terminals (Note 1). They send the (normally) Dolby-encoded signal to the tape deck (Note 2).

⑰ TO TAPE DECK—LINE OUT

tells where to connect these terminals (Note 1). They carry the (normally) Dolby-encoded signal from the tape deck to the AN-180 for de-coding during playback or (monitoring (Note 2).)

⑱ TEST POINT:

For use by the **TEAC** authorized service technician to check the oscillator.

⑲ METER CALIB:

METER CALIBRATION is for your own test of the AN-180. By depressing this switch, you should obtain a CAL position ± 1.5 dB on both calibration meters. When defective return it to the **TEAC** Service Center for adjustment.

⑳ GND:

The ground terminal which should be connected with a short piece of wire to the ground terminals of both the amplifier and the tape deck.

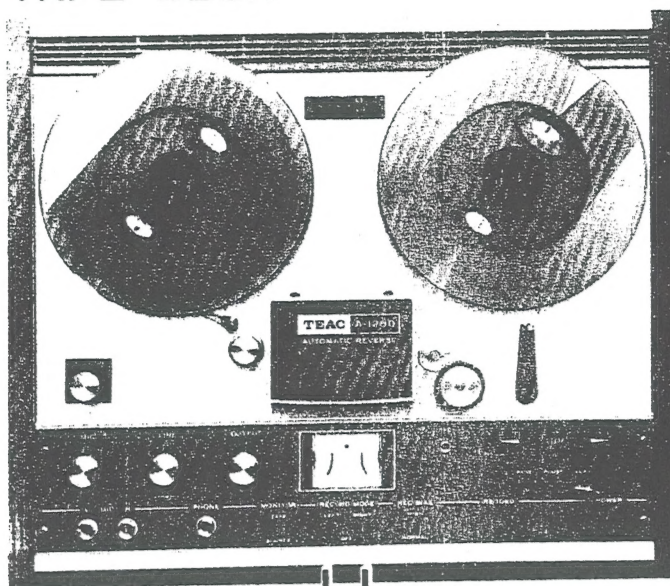
NOTE 1: These connections are standard. See the appropriate sections for connection changes.

NOTE 2: The term “(normally)” used above refers to when the AN-180 is being used in its primary purpose. The type of signal being carried depends upon whether the **DOLBY** switch is **IN** or **OUT** and whether the source material is Dolby or non-Dolby-encoded.

Connecting the AN-180 to your audio system

STANDARD CONNECTION

TAPE DECK



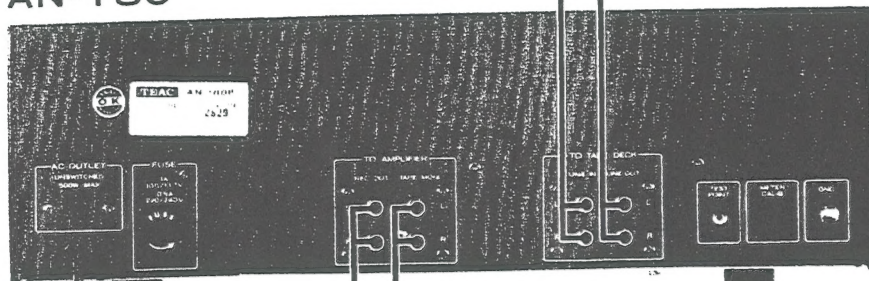
to LINE IN

from LINE OUT

from TO TAPE DECK LINE IN

to TO TAPE DECK LINE OUT

AN-180



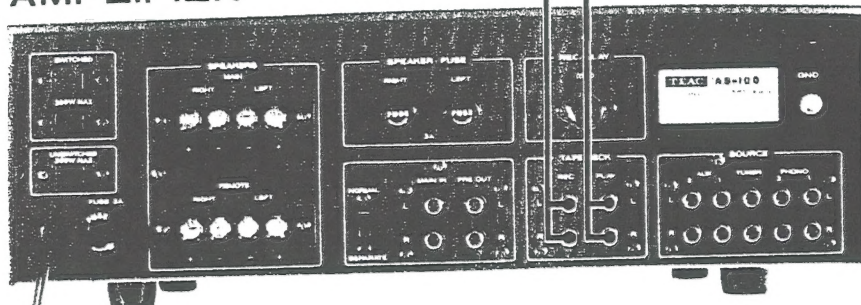
to TO AMPLIFIER REC OUT

from TO AMPLIFIER TAPE MON

from TAPE DECK REC OUT

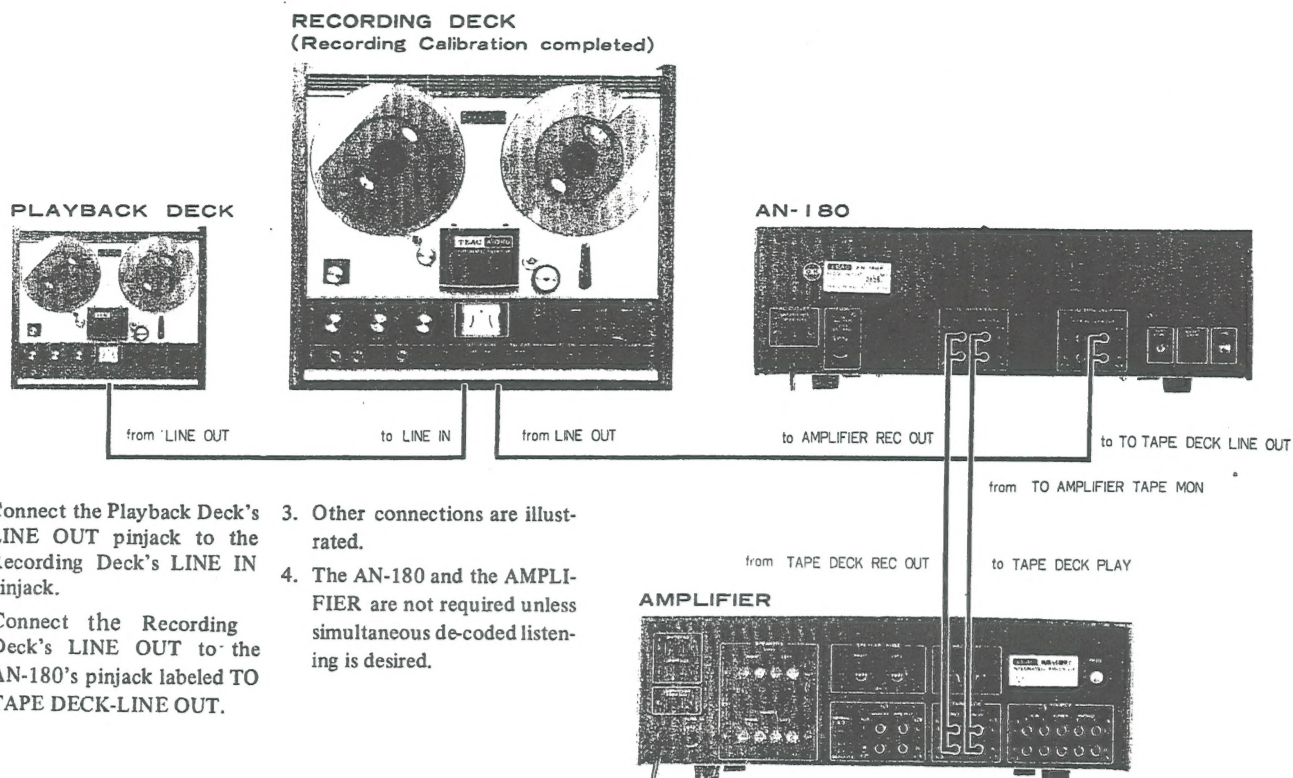
to TAPE DECK PLAY

AMPLIFIER



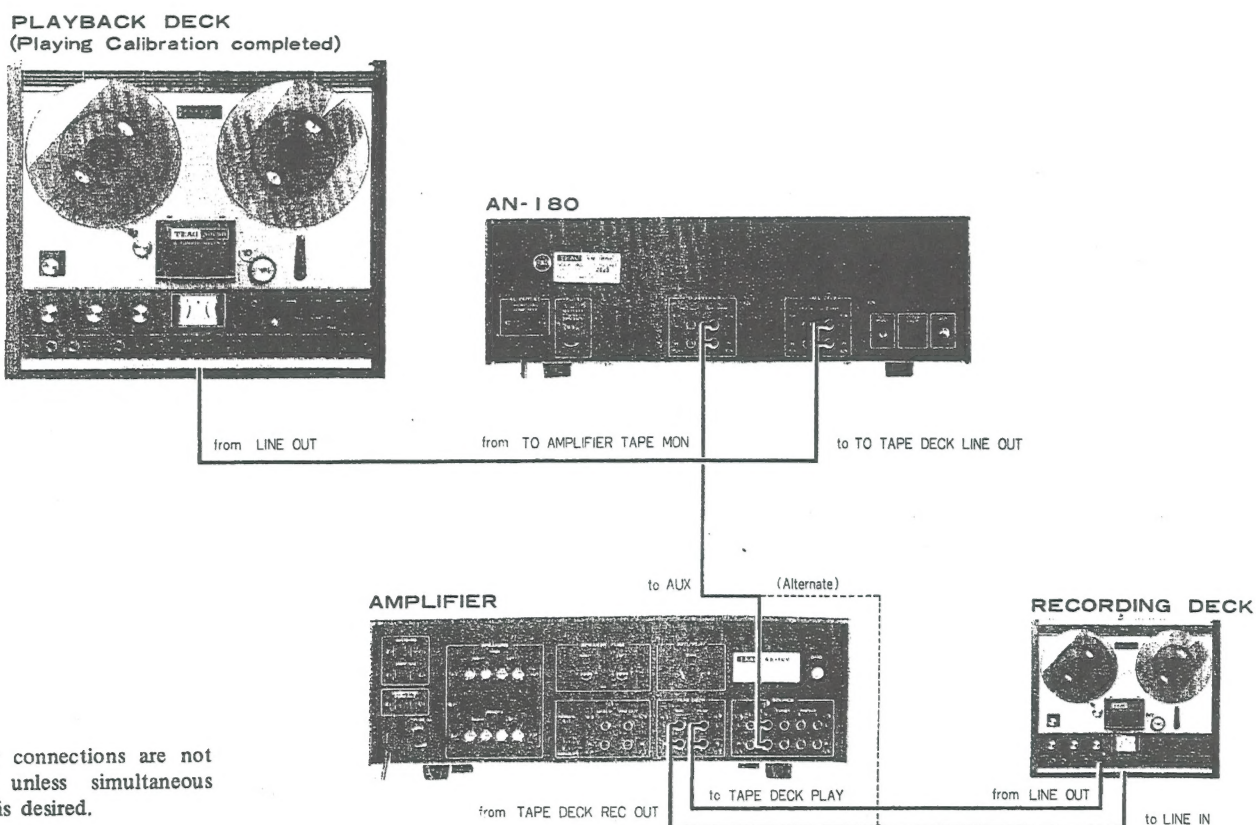
Copying Dolby-encoded to Dolby-encoded tape copying

Note: For instructions, see page 11.



Copying Dolby-encoded to Non-Dolby-encoded

Note: For instructions, see page 11.



Basic operation suggestions

As you may notice when you begin applying the instructions in this manual, we have not been very specific in describing recording techniques to use with your new AN-180. The specifics are limited to the setting of the Dolby levels for recording and playback. Do not be alarmed by this, for the AN-180 is a very tolerant Noise Reduction unit that is designed for use with most of the tape recording systems in use today. (See the inside front cover for limitations). Because of this wide variety of tape decks, it would be an impossibility to describe the exact steps required for each different tape deck. Therefore, we urge you to apply your experience with whichever audio system you now have. Use the owners manual for the particular amplifier and tape deck in conjunction with this manual to obtain the best results. With the AN-180 added to your system, you do not really change your recording procedures. Rather you are encoding your tapes during recording and decoding them during playback with a system that will reduce the tape noise and hiss. After the initial installation, you will have a few additional steps to perform. They may seem complicated and difficult at first. After they have been performed a few times, they will be as automatic as any other routine you perform, such as shifting gears in an automobile. The pleasure returned in increased listening enjoyment will be well worth the first couple of hours you spend learning the new steps. Experiment with your equipment. Find the easiest method for you to add the calibration steps into your routine. Once you have determined the proper settings of your controls, they can be marked with a felt tip pen for quick reference each time you begin.

General points to remember.

1. The AN-180 must have a fixed reference level from which to operate. Once the calibration levels are set, it is very important that are not changed, for that will upset the Dolby effect during the remainder of the recording.
Re-calibration is necessary when:
 - a. You change the brand and type of tape from that used in the previous calibration;
 - b. You use a different tape recorder;
 - c. The level controls on the deck or the calibration controls on the AN-180 have been changed since the last calibration;
 - d. You have any doubts about the calibration, or there has been a long period of time since the last calibration.
2. The circuitry inside the case has been very carefully aligned at the factory. Only TEAC authorized service centers have the equipment, experience and technical data required for re-alignment of the internal adjustments. Therefore, do not open the case or touch any components inside except the power line setting if that is necessary. (See "changing the power line setting")
3. Like most electronic equipment today, the AN-180 requires proper ventilation for proper operation. Do not place it directly upon the tape deck, amplifier, or any other heat producing equipment. Try to operate it only at or below the standard room temperature to avoid damage to the delicate circuit boards.
4. The term "VU" as used in this manual refers to Volume Units. These are also called dB (decibels), but we will use the term VU at it applies specifically to the units marked on VU meters.

Playback circuit calibration

Calibration is something ordinarily associated with servicing electronics equipment, so you may have never realized that you are "calibrating" each time you operate any of your audio components. You are calibrating your tape deck when you turn down the input level to prevent overloading your VU meters. Therefore, calibration is really nothing new to you, and you need not be anxious about the need to calibrate your AN-180.

Calibration is necessary with the Dolby System because you want to match the record and playback halves of the noise reduction process. Simply stated, you are finding the proper setting for your controls so that the sound you record is the same as the sound you play back. Actually, you are establishing the proper Dolby level so that playback will be a "mirror image" of the recording.

The most important tape and cassette in your library were furnished with your AN-180. The cassette Dolby Test Tape and the open reel Dolby Test Tape are the reference your AN-180 needs for matching itself to your tape or cassette deck. Treat them with respect! They represent the Standard Dolby Level which is used with all products and recorded tapes using the Dolby System. Keep them away from all strong magnetic fields such as those from transformers, head and bulk de-magnetizers, and speaker magnets. Keep them in a cool, dry place, and remember that they are your key to accurate calibration.

The open reel tape provides a 400 Hz tone at 7-1/2 ips tape speed. It will work equally well at lower or higher speeds although the pitch will be different. Use the same speed for calibration that you will use during normal playback of Dolbyized tapes.

Playback calibration need be done only once (upon initial installation) provided that:

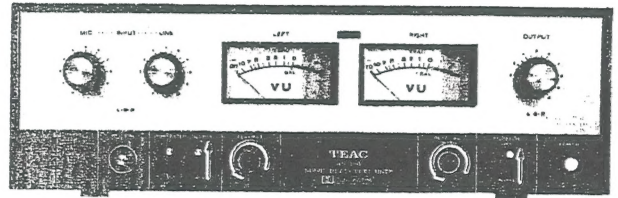
1. the same tape deck is always used
2. the controls are not changed

Number (2) above can be remedied by marking the settings with a felt tip pen, then returning to the calibrated settings if they are changed. Settings will be different for different decks, so re-calibrate when using a different deck. Calibration should also be re-accomplished periodically as a check, monthly or bi-monthly, but you will generally find that the setting will be constant with your AN-180.

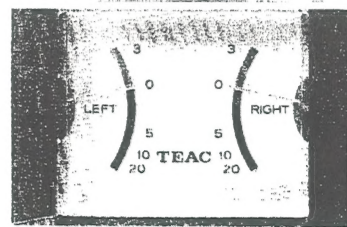
Calibration consists of two stages. The first stage (steps 1 thru 6) establishes a fixed audio level from your deck so that the Dolby unit will have a standard input from which to operate. The remaining steps calibrate the AN-180 for the Standard Dolby Level as played back from the Dolby Level Test Tapes.

NOTE: There is a wide variety of tape decks and cassette decks in use today, so if the steps do not identify the specific controls of your deck, or if your deck does not have certain controls or switches, just read on and do what you can. Remember that basically we are establishing a fixed audio level on the deck output, then using that to calibrate the AN-180. Ensure that tape heads are clean before proceeding.

1. On the AN-180, set the DOLBY switch to IN and the MONITOR switch to TAPE. Rotate the two PLAY CAL controls to the CCW (fully counter-clockwise.)



2. If your deck has a MONITOR select switch, set it to the TAPE position (other than SOURCE).
3. Thread the Dolby Level Test Tape (or insert the Dolby Level Test Cassette) onto the deck.
4. Apply power to the AN-180, the tape or cassette deck, and the amplifier.
5. Start the deck in forward play at the same speed to be used when playing back your encoded tapes.
6. Using the Output Level control on the tape deck, adjust for a 0 VU (bottom of the red line) setting on the deck's VU meters. Mark this setting with a felt tip pen and do not change it.



This is impossible on some decks. The VU meters may not reach 0 VU or they may scale out. The output control may have no effect. If any of these or other difficulties are encountered, the following sub-steps apply. If everything is normal through step 6 (above) then skip the following and proceed to step 7 (below.)

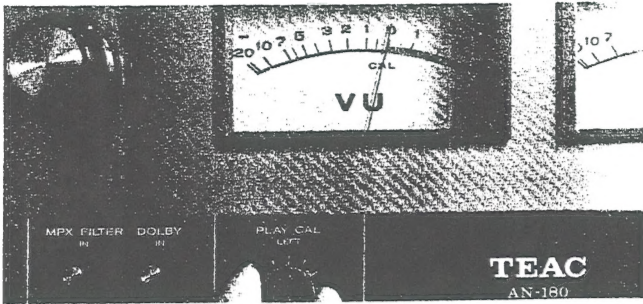
- a. If there is no output control on your deck, the VU meters may be reading low or they may be pegging to the right. Do not worry, just proceed to step 7, for your deck has a fixed output already.
- b. If there is no indication on the VU meters, set the output control for approximately 2/3 clockwise position and mark it. Then proceed to step 7.
- c. If there is an indication on the VU meters, but the output control has no effect upon the reading, then set the control to the position you usually use, such as 2/3 clockwise. Mark it with a felt tip pen and leave it there. The meters may be reading low or pegging to the right, but that is not important since you cannot control them. The tape decks with Sound-On-Sound or Echo features are often in this category. Proceed to step 7.
- d. If the record and playback level controls are on the same control, set for 0 VU (if possible), mark with a felt tip pen, and always return to this setting when you finish recording.

NOTE: The standard output level has now been established on the tape deck. Do not change this setting
(Continued next page)

Recording circuit calibration

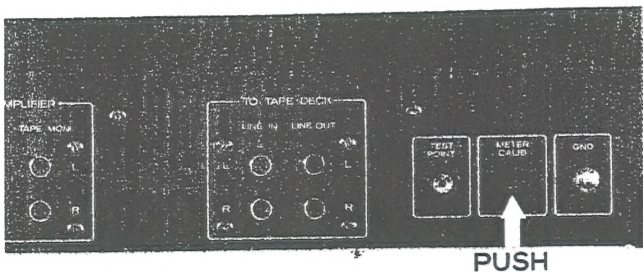
without completely recalibrating for playback again. If the controls have been well marked with a felt tip pen you can simulate recalibration by returning the controls to the marked position.

7. If the test tape has (or is about to) run out, rewind it and re-start it at the beginning.
8. On the AN-180, set the left channel VU meter for 0 VU (CAL position) by adjusting the LEFT-PLAY CAL control. Mark the setting with a felt tip pen.



9. Repeat step 8, but use the RIGHT-PLAY CAL control and the right VU meter on the AN-180. Mark the setting with a felt tip pen.
10. Remove the test tapes and put them in a safe, non-magnetic place. Your AN-180 has now been calibrated for playback. Always proceed directly to recording calibration, for a change in playback calibration requires a recalibration of the recording section.

NOTE: If the VU meters on the AN-180 do not reach the 0 VU indication, check the meters by pushing in the METER CALIBRATION button on the rear of the unit. If defective, return the unit to the place of purchase or the nearest TEAC Authorized Service Center.



NOTE: Before beginning the Recording Calibration, complete the Playback Calibration. Also ensure that all tape heads are clean and all connections are correctly made.

Recording calibration is required to establish the standard reference input level on the tape deck. Once this setting has been established on the tape recorder input, all future recording input levels are set by the MIC and LINE INPUT controls on the AN-180. The AN-180 has a built-in 400 Hz stable audio oscillator with a fixed output. This signal is used to find the optimum setting for the tape deck input control. If the tape deck's input control is changed after this calibration, your recordings will not be based on the Dolby Standard Level. They will lose their dynamic balance and the Dolby process will be defeated. Always calibrate using the same brand and type of tape you will be using for your recording. There are three different calibration procedures printed in this manual. Different procedures are necessary for the various types of open reel and cassette decks in use. Rather than confuse yourself by reading all three procedures; just read the headings and find the system which resembles your tape deck. Follow that procedure for your deck. For convenience we are calling these the Combined Control, the Two-Head and the Three-Head decks.

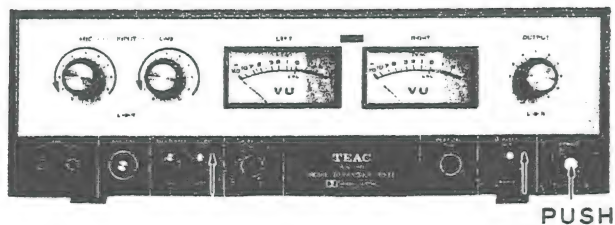
A. Combined Control

Combined Control decks have only one control for input and output level settings. Its use depends upon whether the deck is in the Record or the Playback mode. You have previously marked this control for its Playback Calibration position. Now we will determine its Record Calibration position. To determine the Recording Calibration position, perform the steps in B (Two Head Decks) with one important difference. Since the Input and Output Controls are combined on your deck, it is most important that the Output calibrated setting be distinctly marked. You will be changing the playback setting during Record Calibration, but you must return to it during playback. When the Record Calibration setting is established, mark it so that you can distinguish the Record setting from the Playback setting.

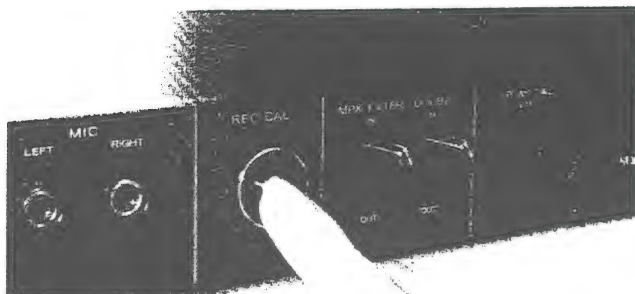
B. Two-Head Decks

Two-head decks have a combination record/playback head. They do not have a true Tape Monitor capability. Any output on them labeled "monitor" is actually the input signal sampled prior to its recording. Most cassette decks are in this category.

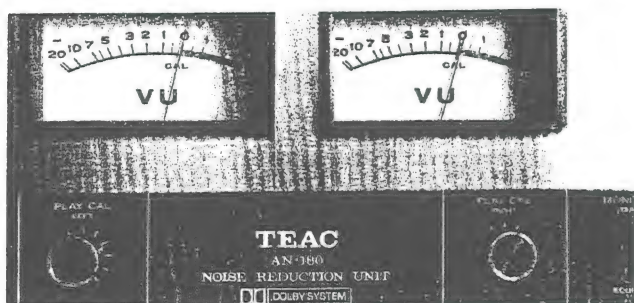
1. Thread a reel of new, blank tape on the deck (or new, blank cassette, whichever). With the transport controls in STOP position, apply power to the deck and the amplifier.
2. On the AN-180, put the DOLBY switch to IN, the MONITOR switch to TAPE, and the MIC and LINE input controls to the fully CCW position. Push the POWER switch to IN (on).



3. Start the tape deck in the forward RECORD mode.
4. Reset the index counter for 000. Then depress the REC CAL button on the AN-180 for approximately 10 seconds. You are now recording the Dolby Standard signal on your tape.

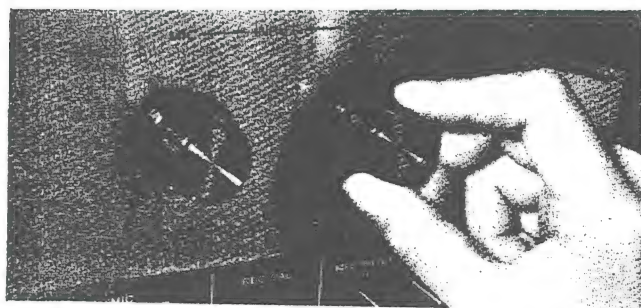


5. Rewind the tape to 000 on the index counter and re-start the deck in the PLAY mode. During playback, observe the VU meters on the AN-180. They should indicate 0 VU (CAL position) on the meters but the chances of them doing so the first time are very remote. Notice how many VU they are above or below CAL on each channel. Stop the tape deck.



6. Estimate how much increase or decrease on the input controls will be necessary to bring the VU meters to 0 VU (CAL). Make the changes on the recorder's input level controls. Repeat steps 3 through 6 until both meters on the AN-180 are at the 0 VU (CAL) position. Disregard the deck's VU meters which may read above or below 0 VU.
7. The input controls on your recorder have now been calibrated for the Standard Dolby Level Input. Mark their position with a felt tip pen, and always use this setting for recording. If a different brand and type of tape or a different amplifier is used, calibration should be re-accomplished.
8. During recording, do not change the setting of the recorder's input level control. Make all adjustments

with the AN-180's INPUT controls and the recorder's VU meters.

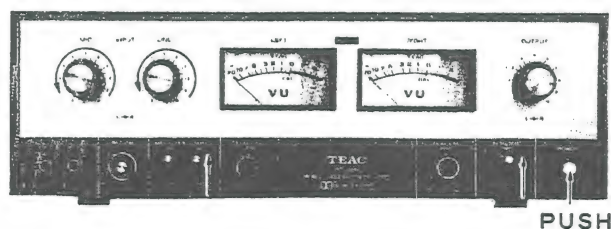


NOTE: If you cannot obtain a 0 VU indication even with the Input controls fully clockwise do not attempt to make Dolby encoded tapes.

C. Three-Head Decks (or Decks with 3-Head Function)

Three-Head decks have separate record and playback heads. Three-head function decks may combine the record and erase into one head, but their record and playback heads are still separate. These types of decks are able to monitor (playback) the recorded signal off of the tape during recording. This monitored signal is sent to the amplifier and then to the AN-180. Most quality open reel decks have this tape monitor capability. If you have any doubts about your deck having a true tape monitor capability, use the Two-Head Deck calibration procedure. It is very satisfactory, although slightly more difficult.

1. Thread a reel of new, blank tape on your deck. Use the same brand and type you will be recording with.
2. With the transport controls in the STOP mode, select your usual recording speed. Apply power to the deck and the amplifier.
3. On the AN-180, place the DOLBY switch to IN, the MONITOR switch to TAPE, and rotate the MIC and LINE input controls fully counter-clockwise (CCW). Push in the power switch to ON.



4. Start the tape deck in the forward RECORD mode.
5. Depress the REC CAL button and observe the VU meters on the AN-180. While the REC CAL button is depressed, adjust the input level controls on the tape deck for a 0 VU (CAL) indication on the AN-180's VU meters.
6. Release the REC CAL button and stop the tape deck. Mark the recording level control setting on the tape deck with a felt tip pen. Always use this same setting when recording with the same brand and type of tape.

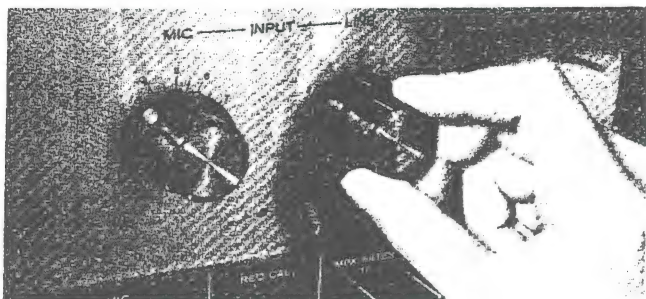
Recording instructions

General suggestions

Your basic recording procedures have not been changed by the incorporation of the Dolby Noise Reduction System. In essence, you have added a step which will encode your tapes so that they will be free of tape hiss during playback after de-coding. If you have connected your components in the proper manner and have performed the playback and recording calibration, you are almost ready to begin making your first Dolby-encoded tape. Before you begin, read over the appropriate sections here to familiarize yourself with the finer points.

The most important points to remember when you are making a new Dolby-encoded tape are:

- 1) Always adjust your recording input level with the input controls on the AN-180, NOT on the tape deck.



- 2) The VU meters on the tape deck are the preferred reference for recording levels when adjusting the LINE INPUT controls on the AN-180.

However, the meters on the AN-180 will follow the recording signal amplitude and may be used as recording level indicators if your deck has small scale meters or uses the "Cat Eye" or "Magic Eye" type of indicator.

- 3) Never change the settings of a calibrated control except during calibration.

A. Recording with an Amplifier as an Audio Control Center

If your amplifier has sufficient connections for the various possible recording sources, you can use it for all your recordings except live recording with microphones. (Use the mic inputs on the AN-180). It is not necessary to use an amplifier for most recording situation, however it must be used when recording from a conventional turntable tone-arm. When an amplifier is used, your recording procedure is changed only by these few points:

1. Connect the AN-180 between the amplifier and the tape deck as illustrated on page 5.
2. Perform the Playback and Recording Calibration procedures if they have not already been accomplished for the type of tape being used.
3. Place the DOLBY switch to the IN position.
4. Make all input adjustments using the input level controls on the AN-180. Use the VU meters on the tape deck for recording level reference.
5. Keep the Monitor switches on the tape deck, the AN-180 and the amplifier in the TAPE position. Momentary source/tape comparison can be made by switching the AN-180 monitor switch to SOURCE.
6. Consult the owners manual for the amplifier and the tape deck for complete recording details.

7. In live recording always connect the microphones directly to the AN-180.

B. Recording without an amplifier

As mentioned above, an amplifier is not essential for any Dolby recording process except when recording from a turntable. The three basic essentials are a tape deck, the AN-180 and a source, which may be a tuner, microphones, or another tape deck or cassette deck.

• FM broadcast recording from an FM Tuner (Non-Dolby-encoded)

(NOTE: If your tuner is integrated into your amplifier as a tuner/amplifier, this section does not apply)

1. Connect your AN-180 to the tape deck or cassette deck as described on page 5. (Omit the amplifier connections in this case.)
2. Connect the FM tuner outputs to the terminals labeled TO AMPLIFIER — REC OUT on the AN-180. (If a separate amplifier is used, connect the FM tuner outputs to the amplifier Tuner Input terminals and follow the procedures in section A, above.)
3. There will be no connections to the TAPE MON terminals on the AN-180.
4. Connect headsets to the tape deck for audio monitoring. Do not move the output controls on the tape deck for that will defeat the Playback Calibration on the tape deck.
5. Place the DOLBY switch to the IN position
6. Place the MPX FILTER switch to the IN position.
7. During tuning, place the MONITOR switch on the tape deck to the source position to enable hearing the incoming signal. During recording, keep all monitor switches in the TAPE position.
8. Make all input adjustments by using the LINE INPUT control on the AN-180 and the VU meters on the tape deck.
9. Consult the owners manual for your tape deck and tuner for complete recording instruction.
10. If the FM broadcast is already Dolby-encoded prior to transmission, see Dolby FM-broadcast reception, page 17.

Recording from one tape recorder to another (Non-Dolby-encoded to Dolby-encoded)

As mentioned in the introductory test to this manual, the AN-180 is not a filter. This point is important especially when making a Dolby-encoded tape from another, non-Dolby-encoded tape. The primary advantage of the Dolby System is achieved when making the original recording. However, when making copies without Dolby, the new tape noise will add to the former tape's noise with each recording. By using the AN-180 when making a first copy from a non-Dolby-encoded tape, you can prevent further noise build-up. (For transcribing Dolby-encoded tapes, see section C.) The AN-180 will not remove the tape noise and hiss present in the original, non-Dolby encoded tape.

(The following steps refer to interconnections when an amplifier is not used.)

1. Connect the Playback tape decks LINE OUTPUT terminals to the AN-180's terminals marked TO AMPLIFIER -REC OUT.
2. Perform the PLAYBACK and RECORDING CALIBRATION procedures on the deck which will be recording if not previously accomplished. Calibration is not performed on the playback deck which has the non-Dolby-encoded tape.
3. Copy the tape in the usual manner EXCEPT:
 - a. Have the DOLBY switch IN on the AN-180 and the MPX FILTER switch OUT.
 - b. Make all input level adjustments using the INPUT level controls on the AN-180. Do not adjust the previously calibrated level controls on the recording deck.
 - c. Place all MONITOR switches to the TAPE position. Use the MONITOR switch on the recording deck to compare TAPE and SOURCE.
4. Use the VU meters on the recording deck for observing the input level. The VU meters on the AN-180 are used for calibration only and they may differ in their readings from the recording deck's VU meters.
5. If your playback tape deck has a LINE OUTPUT level control, place it approximately at the center of its range to prevent distortion. This setting will be based upon your experience and the characteristics of your machine.

• **Live recording with microphones**

1. Connect the tape or cassette deck to the AN-180 as follows:
 - a) AN-180 terminals labeled TO TAPE DECK-LINE IN to the tape deck's LINE IN terminals;
 - b) AN-180 terminals labeled TO TAPE DECK-LINE OUT to the tape deck's LINE OUTPUT terminals.
2. Perform Playback and Record Calibration if not previously accomplished for the type of tape being used.
3. Connect the microphones directly into the AN-180 MIC-LEFT and RIGHT inputs. If the microphones are connected directly to the tape deck, Dolby process is bypassed. See "Specifications" on page 17 for microphone input sensitivity requirements.
4. Place the DOLBY switch IN, the MPX FILTER switch OUT, and rotate the LINE INPUT controls fully CCW on the AN-180.
5. On the tape deck, do not adjust the LINE INPUT controls and keep the deck's MIC INPUT controls fully CCW.
6. All recording input level adjustment is done from the AN-180's MIC INPUT level controls. Use the tape decks VU meters to determine the input level.

(NOTE: This topic does not include MIC/LINE Mixing. See section "D" below for further instructions about MIC/LINE Mixing.)

C. Copying Dolby-encoded Tapes

Dolby-encoded tapes may be accurately copied without using an amplifier. The diagrams on page 6 show the proper connections to use if you wish to listen while you are copying. When making Dolby-encoded copies (Dolby-

encoded to Dolby-encoded), only the two tape decks are required if you do not want simultaneous de-coded listening. When making non-Dolby encoded copies from Dolby-encoded tapes, the amplifier may be bypassed as shown by the dotted connection. We will describe the procedures below as if you are listening simultaneously.

Dolby-encoded to Dolby-encoded

Many decks (especially cassette decks) are now available with built-in Dolby circuitry. If one of the two decks you use when copying Dolby-encoded tapes is equipped with Dolby circuitry, you must keep its Dolby switch OUT. As long as the deck's Dolby switch is OUT and you follow the procedures below, the copies you make will work equally well when played back on a standard deck with the separate Dolby System unit (such as the AN-180) or on another deck with built-in Dolby System.

NOTE: If headsets are used on either deck, you will hear the Dolby-encoded signal, which will sound somewhat "brighter" than usual.

1. Connect the components as illustrated on the upper half of page 6.
2. Place all Monitor switches to the TAPE position.
3. a. Play the Dolby Level Test Tape on the recording deck and calibrate:
 - i. Its output controls for 0 VU.
 - ii. AN-180 PLAY CAL controls for 0 VU on AN-180 meters.
- b. Play the Dolby Level Test Tape on the playback deck and calibrate the record level of the recording deck as follows:
 - i. Adjust the record deck's input controls until its meters read 0 VU.
 - ii. Record for about 10 seconds, rewind and replay.
 - iii. Check the replay level on the AN-180's meters, it should be 0 VU:
if it is not, adjust the record level accordingly and record another 10 seconds.
 - vi. Repeat section iii until the replay level is 0 VU.
- c. The sequential record/replay process is not necessary with 3-head decks with off-tape monitor facilities, for the input level control is adjusted until the AN-180's meters read 0 VU.
4. Place the tape you wish to copy onto the Playback deck.
5. When recording, start the Recording deck before you begin the Playback deck to avoid losing any of the program.
6. Make all listening level adjustments with the AN-180 output and the amplifier output controls. You cannot change any level control on the decks without losing the Dolby Standard Level.

• **Dolby-encoded to non-Dolby-encoded**

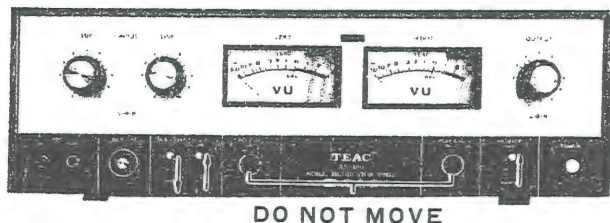
Connect your components as illustrated in the lower illustration on page

If you do not want simultaneous listening, you may bypass the amplifier by connecting the AN-180 to the recording deck as shown by the dotted line. In that case, there will be no connection to the recording deck's Output terminals.

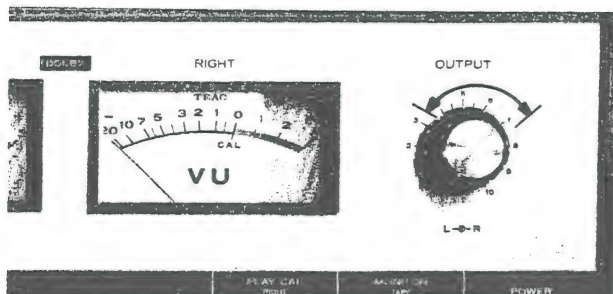
(continued next page)

The playback deck must be calibrated as described in the **PLAYBACK CALIBRATION** section of this manual. No calibration is needed on the Recording deck, for it will be receiving a non-Dolby-encoded program.

1. On the AN-180, place the **DOLBY** switch **IN**, the **MONITOR** switch to **TAPE**, the **MPX FILTER** switch **OUT**, and do not move the **PLAY CAL** controls after calibration.



2. Both tape decks must have the Monitor switches set for Tape.
3. After calibrating the Playback deck, do not change the Output controls.
4. Set the AN-180 **OUTPUT** controls for the best level between the 10:00 o'clock and 2:00 o'clock positions of the control. Do not change this setting during recording for it will affect the recording input level.



5. If your Recording deck has a Pause control, you may use it to keep your deck in the recording mode while you set the Recording deck's Input Level controls for the best recording level. Then rewind the Dolby-encoded tape, release the Pause control and begin recording.
6. Always start the Recording deck before you begin the Playback deck. This will prevent any loss of the program.
7. Make all your listening level adjustments from the amplifier's speaker output controls. If you change any other components output control, it will affect the recording input level.

D. MIC/LINE MIXING

MIC/LINE mixing is the process of adding a live, microphone signal onto the recording at the same time that you are recording from another source, such as from a tuner, another tape or a recorded disc. Thus, you can be commenting on a recording while it is being made, sing along with your favorite group, or add any kind of original recording to the LINE signal.

This mixing must be done through the AN-180 to avoid bypassing the Dolby process. Therefore, plug the microphones into the front of the AN-180. Follow the suggestions below for successful mixing.

1. Combine the applicable portions of Live Recording and whatever other section of this manual that covers the recording of the source you are mixing with.
2. As the strength of the microphone signal will be added to the input level from your other source, the VU meters on the tape deck will indicate a higher level than that seen with only source or only microphone. Balance the MIC INPUT control and the LINE INPUT control on the AN-180 to achieve the desired input level without overloading the tape deck input. Experimentation will be necessary before the desired balance of MIC and LINE can be achieved. Try keeping the VU meters on the tape deck close to the desired level as you raise the MIC level while simultaneously lowering the LINE level setting or vice versa.
3. If the mixing is to be an occasional rather than continuous process during a recording, keep the MIC INPUT level controls fully CCW before switching off the microphones. This will prevent recording the clicks from the microphone switches and it will keep out background noise when the mic input is not being used.

Playback instructions

Dolby FM broadcast reception

Playback of Dolby-encoded tapes is similar to conventional playback with the following exceptions:

1. The AN-180 must be connected between your tape or cassette deck and the amplifier as described on page 5.
2. The DOLBY switch must be in the IN position.
3. The PLAYBACK CALIBRATION must have been properly accomplished.

There are a few other points to consider for special situations.

1. If your tape or cassette deck has a built-in Dolby circuit, you need not disconnect the AN-180. You must, however, use the Dolby circuitry on the deck and, in this case, leave the AN-180's DOLBY switch OUT.
2. Non-Dolby-encoded tapes will be played satisfactorily with the AN-180 connected. However, keep the DOLBY switch on the AN-180 in the OUT position or the tapes will sound flat.
3. The MPX FILTER switch should be kept in the OUT position except when recording or listening to FM broadcasts.
4. Dolby-encoded tapes will play reasonably well on systems without a Dolby Noise Reduction System. However, they will sound somewhat brighter than normal and the tape noise will be present. A comfortable balance can be achieved by using the tone controls to decrease the treble.
5. Provided that the calibration is properly performed at every stage, tapes encoded on any Dolby Noise Reduction Unit such as the AN-180 should work equally well when played back on any other Dolby circuitry available. Commercially available tapes already encoded for Dolby will work perfectly with the TEAC AN-180.
6. Always disconnect any DIN cords between the amplifier and tape deck when the AN-180 is connected.

1. Dolby-encoded FM reception without simultaneous recording

Connect the components as illustrated in diagram #1 or #2. Prepare the AN-180 and the other components as follows before the beginning of the broadcast. On the AN-180, set the DOLBY switch IN, the MPX FILTER switch IN, and the MONITOR switch to TAPE. Apply power to all the components and tune in the station. Set the audio levels to the desired listening level. The amplifier must be set for Tape Monitor rather than FM listening mode, for the AN-180 is connected across the tape recorder connections of the amplifier. Set the OUTPUT controls of the AN-180 around the 12 o'clock position.

When the FM station begins transmitting the 400 Hz Dolby Standard Level test tone, use it to calibrate the LEFT and RIGHT PLAY CAL controls of the AN-180 to obtain the 0 VU (CAL) readings on each of the calibration meters. After calibrating, make all your listening level adjustments with the OUTPUT controls on the AN-180. Do not change the PLAY CAL settings or the output of the separate tuner (if applicable.)

"Dolby encoded FM broadcasts are still in their infancy and have established no definite pattern in regards to where or how the Dolby Tone will or should be transmitted throughout the program. In other words, the explanation in this manual is made on the presumption that the Dolby Tone will be transmitted at the beginning of each encoded program, since this would be the most appropriate point in the program."

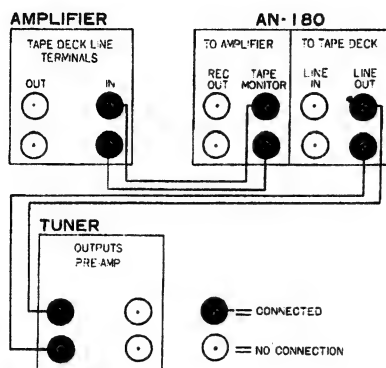
If you have tuned in the Dolby-encoded broadcast after the calibration tone was transmitted, you may make a coarse calibration that will provide generally satisfactory decoding. With the components connected as described above, set the PLAY CAL controls so that the AN-180 VU meters have an average reading of approximately -4 VU. The meter needles should then swing between -7 VU and -1 VU. Again, this is only a coarse approximation of the calibrated setting and should be used only if you have missed the transmitted tone.

Diagram #1: Dolby-FM reception with tuner and separate amplifier

NOTE: Labels on your equipment may be different. Consult your owner's manuals for identification of terminals.

Diagram #1: Dolby-FM reception with tuner and separate amplifier

NOTE: Labels on your equipment may be different. Consult your owner's manuals for identification of terminals.

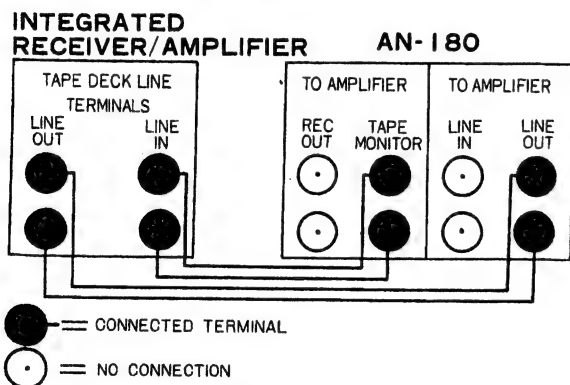


AMP MODE: Tape Monitor

AN-180 { DOLBY IN
MPX FILTER IN
MONITOR TAPE
Calibrate FM transmitted tone

Diagram #2: Dolby-FM reception with an integrated receiver/amplifier

NOTE: The integrated receiver/amplifier must have Tape Monitor capability, which means that you can listen to the tape recorder output while recording the FM broadcast.



MODE: Tape Monitor with FM recording (You will simulate recording an FM broadcast with the AN-180 now replacing the tape deck.)

AN-180 { DOLBY IN
MPX FILTER IN
MONITOR TAPE
Calibrate FM transmitted tone

2. Simultaneous decoded FM listening and encoded recording

Connect the components as illustrated in Diagram #3 or #4. Make the following preparations several minutes before the start of the Dolby-encoded FM broadcast:

- Set all Tape/Source monitor switches to the TAPE position, and that includes the amplifier, the tape deck and the AN-180;
- On the AN-180, set the DOLBY switch IN, the MPX FILTER switch IN, and set the output controls to approximately the 12 o'clock position;
- Thread the Dolby Level Test Tape on the tape deck and adjust the tape deck OUTPUT control to obtain 0 VU on the deck meter. Then, adjust PLAY CAL control for CAL (0 VU) on the AN-180 meters.
- Temporarily set the tape deck MONITOR switch to SOURCE and tune-in the desired FM station. After the station is tuned-in, immediately return the MONITOR switch to TAPE.
- Thread a blank tape on the deck and standby for recording.

For 3 head decks (those with Tape Monitor capability)

(Note: The following steps are for 3-head decks. See the following section for 2-head decks.)

When the FM broadcast begins and the Dolby Tone is transmitted, go through the following procedures:

- Start the tape deck in the recording mode.
- Adjust the tape deck LINE IN control to obtain CAL (0 VU) reading on the VU meters of the AN-180.

The FM broadcast is then recorded with the controls as set.

NOTE 1: After the above adjustment is completed, recalibration is not necessary unless the type of blank tape is changed.

NOTE 2: After completing the level calibration, be careful not to touch the LINE IN control or OUTPUT control of the tape deck, or the PLAY CAL control of the AN-180.

NOTE 3: Balance the audio level controls between the AN-180 OUTPUT LEVEL controls and the amplifier speaker output controls so that they are similarly positioned. In other words, do not have the AN-180 OUTPUT controls fully clockwise while the audio amplifier controls are fully counter-clockwise, or vice-versa.

For 2 head decks

In this case, the procedures from and after Step f will be different from those for the 3 head decks. Follow the procedures below upon completing Step e above.

- f' For the purpose of calibrating the tape deck and the AN-180, temporarily interconnect the TO TAPE DECK-LINE IN terminal on the AN-180, and the LINE IN terminal on the tape deck, as shown in Diagram #5;
- g' Start the tape deck in the recording mode;
- h' While depressing the REC CAL button on the AN-180 for a calibration tone, temporarily adjust the tape deck LINE IN control for a 0 VU reading on the tape deck meters.
(If there is a tape counter on your deck, it will be convenient for rewinding back to the same spot if you will set it to "000" at this point of the procedure);
- i' Record the calibration tone for several seconds, and then rewind the tape back to its starting point. If the tape counter was used, it should be re-set to "000".
- j' Playback the tape and note the AN-180 meter reading. Should the reading be CAL (0 VU), you may proceed to Step k'. If the reading is not CAL (0 VU) at the first try, repeat the procedures from Step g' until a CAL (0 VU) reading is obtained by adjusting the tape deck LINE IN control. Mark the reading on the deck's VU meter glass for any calibrated reading other than 0 VU.

Example: Assuming your reading obtained in Step j' is -2 VU, return to Steps g' and h', adjust the tape deck LINE IN control for a +2 VU reading on the tape deck meter, rewind back to the starting point, and read the AN-180 meter. If this should be CAL (0 VU), mark the tape deck meter glass at the +2 VU point for later reference.

NOTE: When using a tape deck which will not allow such procedures, refer to RECORDING CIRCUIT CALIBRATION on page 9.

- k' Disconnect the cables installed in Step f to return the system back to its original connection (either Diagram #3 or #4);
- l' Start the tape deck in the recording mode;

- m' Using this Dolby Tone, adjust the tape deck LINE IN control to bring the tape deck meter reading to the point marked on the meter glass as instructed in Step j'. The FM broadcast is then recorded while in this condition.

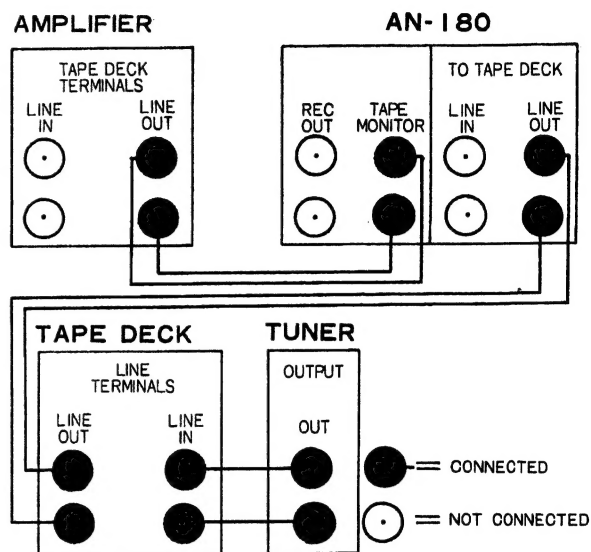
NOTE 1: After the above adjustment is completed, recalibration is not necessary unless the type of blank tape is changed.

NOTE 2: After completing the above calibration, be careful not to touch the LINE IN and OUTPUT controls of the tape deck, and the PLAY CAL control of the AN-180.

NOTE 3: Balance the audio level controls between the AN-180 OUTPUT LEVEL controls and the

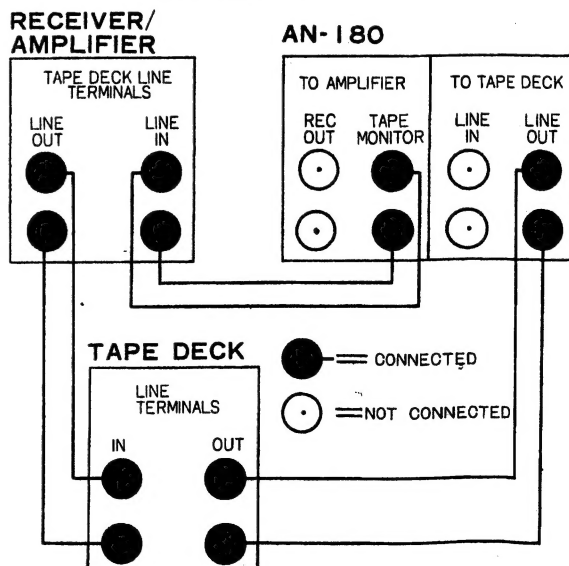
amplifier speaker output controls so that they are similarly positioned. In other words, do not have the AN-180 OUTPUT controls fully clockwise while the audio amplifier controls are fully counter-clockwise, or vice-versa.

Diagram #3: Simultaneous recording and listening to a Dolby-encoded FM broadcast using a tuner with a separate amplifier.



AMP MODE	Tape Monitor
AN-180	DOLBY IN
	MPX FILTER IN
	MONITOR TAPE
	Calibrate FM transmitted tone
TAPE DECK	Monitor Tape
	Calibrate input using FM transmitted tone

Diagram #4: Simultaneous recording and listening to Dolby-encoded FM broadcasts using an integrated receiver/amplifier.



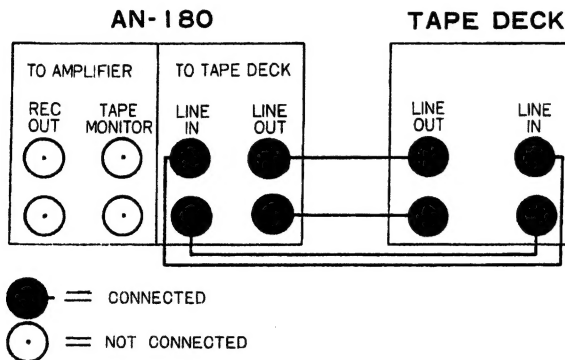
Changing the power line setting

AMP MODE Tape Monitor
Tune FM Broadcast
Record source . . . FM

TAPE DECK { Monitor tape
Calibrate. to FM transmitted tone
DOLBY IN
MPX FILTER . . . IN
AN-180 { MONITOR TAPE
Calibrate use the FM transmitted tone as monitor from tape deck.

NOTE: The integrated receiver/amplifier must have Tape Monitor capability, which means that you can listen to the tape recorder output while recording the FM broadcast.

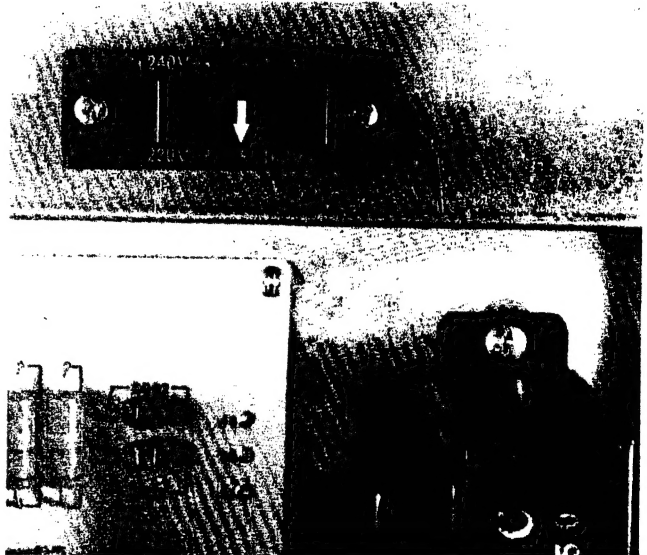
Diagram #5: Temporary connections for calibrating the AN-180 and 2-head decks.



DOLBY = IN
MPX FILTER = IN
MONITOR = TAPE

Changing the power line setting

1. Remove the screws on the side panels and lift off the case.
2. In the right-rear corner on the top of the inside panel is a plug with an arrow pointing to a specific voltage. If it is pointing to your AC line voltage, leave it there.
3. If the indicated voltage is different from yours, carefully pull out the plug and position it so that the arrow points to the correct voltage. Rock it back into the correct position. After removing your hand, re-check to see that it now reads the correct voltage and is completely inserted.
4. Replace the screws and the cover. If you move to another country with a different line voltage, you will have to change it again.



CAUTION: DO NOT DISTURB ANY OTHER COMPONENT WITHIN THE COVERED COMPARTMENT. INTERNAL CALIBRATION SHOULD BE ACCOMPLISHED ONLY BY AUTHORIZED SERVICE CENTERS.

* US model is 117 V only.

Specifications

Frequency response:	20 ~ 20,000 Hz \pm 1.5 dB
Increased SN ratio:	10,000 Hz: 10 dB
	1,000 Hz: 5 dB
	Overall: 6 dB or more
	(“B” weighting network)
Input sensitivity:	Microphone: 0.25 mV/-72 dB
	(600 ~ 10,000 ohms)
	Line: 0.1 V
Input impedance:	Microphone: 50,000 ohms
	Line: 100,000 ohms
Output:	To tape deck input: 0.5 V
	Line : 1 V
Harmonic distortion:	0.3 % or less
Multiplex filter:	19 KHz: -35 dB or more
	38 KHz: -30 dB or more
Channel separation:	55 dB or more
Oscillator output level:	0.1 V
Tone oscillator:	400 Hz
Power requirements:	100/117/220/240 V AC, 50/60 Hz
	(US model is 117 V, 60 Hz only.) 6 W
AC outlet:	500 W (maximum)
Dimensions:	5-1/2”(H) x 16-1/8”(W) x 12-3/4”(D)
	[140(H) x 410(W) x 325(D) mm]
Weight:	15-1/2 lbs (7 Kg) net
Standard accessories:	Dolby Level Tape (open reel)
	Dolby Level Tape (cassette)
	Input/output connection cords
	Fuse
	Hex wrench
	Silicone cloth

*Features and specifications subject to change without notice.

AN-180 BLOCK DIAGRAM

